Running Hyperledger Fabric on OpenShift

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Agenda

- OpenShift and Kubernetes
- Hyperledger
- Hyperledger Fabric
- Issues with Running Hyperledger Fabric on OpenShift
- Workarounds - Ongoing Activities
- Join the Fun!
- Additional Resources
- Q&A
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Kubernetes and OpenShift
OPENSHPIFT CONTAINER PLATFORM

Application Services
Middleware, Service Mesh, Functions, ISV

Cluster Services
Metrics, Chargeback, Registry, Logging

Developer Services
Dev Tools, Automated Builds, CI/CD, IDE

Automated Operations*

Kubernetes

Red Hat Enterprise Linux or Red Hat CoreOS

Best IT Ops Experience  CaaS  PaaS  Best Developer Experience

*coming soon
CONTAINER CHALLENGES

Container Security
Image scanning, patching and compliance.

Day 2 Management
Install, upgrade and maintenance. Integrate existing enterprise technology.

Application Delivery
Monitoring, metering and management. Integrate existing developer tools.

trusted enterprise Kubernetes
Continuous security, world-class support and services, and deep expertise to confidently run any application.

A cloud-like experience, everywhere
Full-stack automated operations on a consistent foundation across on-premises or hybrid cloud infrastructure.

Empowering developers to innovate
Get applications to production sooner with a wide range of technologies and streamlined workflows.
Hyperledger and Fabric
Hyperledger is a collaborative and global open source software community, hosted by The Linux Foundation, advancing blockchain technologies for business.
Hyperledger Goals
Where open source teams build diverse approaches for business blockchain

Create enterprise grade software
open source, distributed ledger frameworks & code bases to support business transactions

Provide community-driven infrastructures
that are open, neutral and supported by technical and business governance

Build technical communities
to develop blockchain and shared ledger POCs, use cases, field trials and deployments

Educate the public
about the market opportunity for blockchain technology

Promote our communities
taking a toolkit approach with many platforms and frameworks
Hyperledger Momentum

- Years since launch: 3
- Commits: 126K+
- Tools: 6
- Frameworks: 6
- 1.0+ Production Releases: 3
- Members: 260+ (50+ in AsiaPac)
- Active Community Working Groups & Special Interest Groups: 11
- Meetups Worldwide (66 countries): 165+
- Meetup Participants: 56K+
- Media Clips Per Month: 2,000+
Hyperledger Fabric
An enterprise grade permissioned distributed ledger platform that offers modularity and versatility to satisfy a broad set of industry use cases including finance, healthcare, supply-chain, and more.

300+ devs across 100+ companies contributing.
500+ customer PoCs, pilots and production.
Hyperledger Fabric Project News

- Maintaining a quarterly release cadence
- Hyperledger Fabric v1.4.1 released April 2019
- Hyperledger Fabric v2.0.0-alpha released for early access testing
- v1.4.x is our first long term support release

**New Features:**
- v1.4.1 support for Raft consensus orderer
- v2.0.0-alpha
  - new chaincode lifecycle support
  - FabToken support
  - Alpine based images
  - StateDB caching expected when 2.0 GAs this summer
Characteristics

- Permissioned
- Highly modular
- Smart contracts in general purpose languages
- Pluggable consensus
- Privacy
- No “mining” or native crypto-currency required for consensus
- *Execute-order-validate vs order-execute*
Architecture

Client Application | SDK (HFC)  

Membership Services Provider

Ordering Service

Peer

Endorser

Committer

Ledger

Chaincode

Events
Hyperledger Fabric Runs On All Major Clouds
Issues with Fabric on OpenShift
Main Issues

- Most Hyperledger Fabric deployment examples are designed for Docker based installs
  - Use of host mounts
  - Use of docker-compose and docker calls
  - Assume a single system
  - Not kubernetes friendly

- Use of Peer Managed Containers for Chaincode
  - Docker in Docker
Problem: Peer-Managed Containers

- Chaincode doesn’t work well with standard cloud native stack
  - Chaincode can’t be provisioned and scaled by cloud native tools
  - Chaincode produced by peer lives in peer’s docker store causing name collision

- Peer requires elevated privilege
  - Non-standard security practice
  - Peer is not contained by the container: a malicious peer can access host system
  - Standard practices don’t allow elevated privilege in production
Solutions
Short Term

● No immediate way around Docker in Docker
  ○ Security risk remains so evaluate risks before production use
  ○ `setenforce permissive`
    ■ Allows use of docker.sock
    ■ Make sure you change it on all the nodes
  ○ `oc adm policy add-scc-to-user anyuid -z default`
    ■ Privileged mode
Short Term

- Hyperledger Cello
  - Now supports Ansible
  - [https://www.hyperledger.org/projects/cello](https://www.hyperledger.org/projects/cello)

- Hyperledger Lab - Nephos
  - Python and Helm based
    - Requires python3.7 - not on RHEL7
  - [https://github.com/hyperledger-labs/nephos](https://github.com/hyperledger-labs/nephos)

- Brute Force
Short Term - Brute Force!

- Look to use Secrets and ConfigMaps to replace host mounts
- Use NFS mounts where needed
  - `oc adm policy add-scc-to-user hostmount-anyuid -z default`
- Replace `docker-compose`, `docker` calls with:
  - `kubectl`, `oc`, `podman`, `Buildah`, `kompose`
- Convert `docker-compose.yaml` files with `kompose`
  - `kompose convert --provider=openshift -f`
    - Then edit and merge files
- Alternate (if fairly simple yaml file)
  - `kompose up --provider==openshift -f`
Long Term

- Chaincode deployment and life cycle management redesign
  - Design work ongoing in Hyperledger Fabric v2 stream
  - [https://jira.hyperledger.org/browse/FAB-14492](https://jira.hyperledger.org/browse/FAB-14492)
  - [https://jira.hyperledger.org/browse/FAB-14493](https://jira.hyperledger.org/browse/FAB-14493)

- Potential use of operators to manage containers
Potential Long Term Activities

● See disclaimer slide at start of presentation!
  ○ None of this is promised!

● Build containers on RHEL / UBI base
  ○ Would provide Red Hat ease of mind

● Get OpenShift into the Hyperledger CI/CD stream
  ○ Find issues before code changes accepted

● Middleware Integration
  ○ Replace Kafka with AMQ Streams
  ○ Camel, Fuse, etc
Ready, Set, Go

A quick overview of running Hyperledger Fabric on OpenShift 3.11

# Create a new project
oc new-project hyperledger

# Required to allow pods /containers to run as root
oc adm policy add-scc-to-user anyuid -z default

# This is also needed if you choose to use hostmount as a PV
oc adm policy add-scc-to-user hostmount-anyuid -z default

# Get the bits
git clone https://github.com/IBM/blockchain-network-on-kubernetes.git
Ready, Set, Go

# Get in the proper place
cd blockchain-network-on-kubernetes

# Set up storage definition to support NFS mount
vi configFiles/createVolume.yaml

# Mark the setup and delete as executable
chmod +x setup_blockchainNetworkv1.sh
chmod +x delete_blockchainNetwork.sh

# Run the install
./setup_blockchainNetworkv1.sh
Join the Fun!
Contributing to Hyperledger Fabric

- You don’t need to be a member of Hyperledger to contribute
  - A Linux Foundation ID is needed to submit code though

- Many ways to be involved
  - Filing defects, enhancement requests, code fixes, etc

- A great “How to Contribute” document can be found here:
A Few Ways to Participate in Hyperledger

- **Subscribe** to Hyperledger Mailing Lists
- **Attend** Hyperledger Hackfests and upcoming blockchain events
- Get the latest development updates from the wiki
- Engage in the discussion on Chat
- Search for Open Bugs, or Report a New One, in Our Bug Database
- Start or join a local Hyperledger Meetup
- **Participate** in the Working Group meetings
- Check out all the Hyperledger business blockchain technologies and download our codebases

On-demand Webinar: [Get Involved! How to get started with Hyperledger](#)
Participating in Hyperledger

- There are a wide range of subject areas
  - Identity, crypto, learning materials, documentation, marketing, ...
  - Research (WG, SIGs)
    - Supply chain, telecom, FSI, public sector, social impact, ...
  - Diversity and Inclusion
  - Project contributors
    - Many different programming languages
    - Many different technologies
Additional Resources
For More Information

- https://www.hyperledger.org/
- http://kompose.io
Q & A
THANK YOU

linkedin.com/company/Red-Hat

facebook.com/RedHatinc

youtube.com/user/RedHatVideos

twitter.com/RedHat